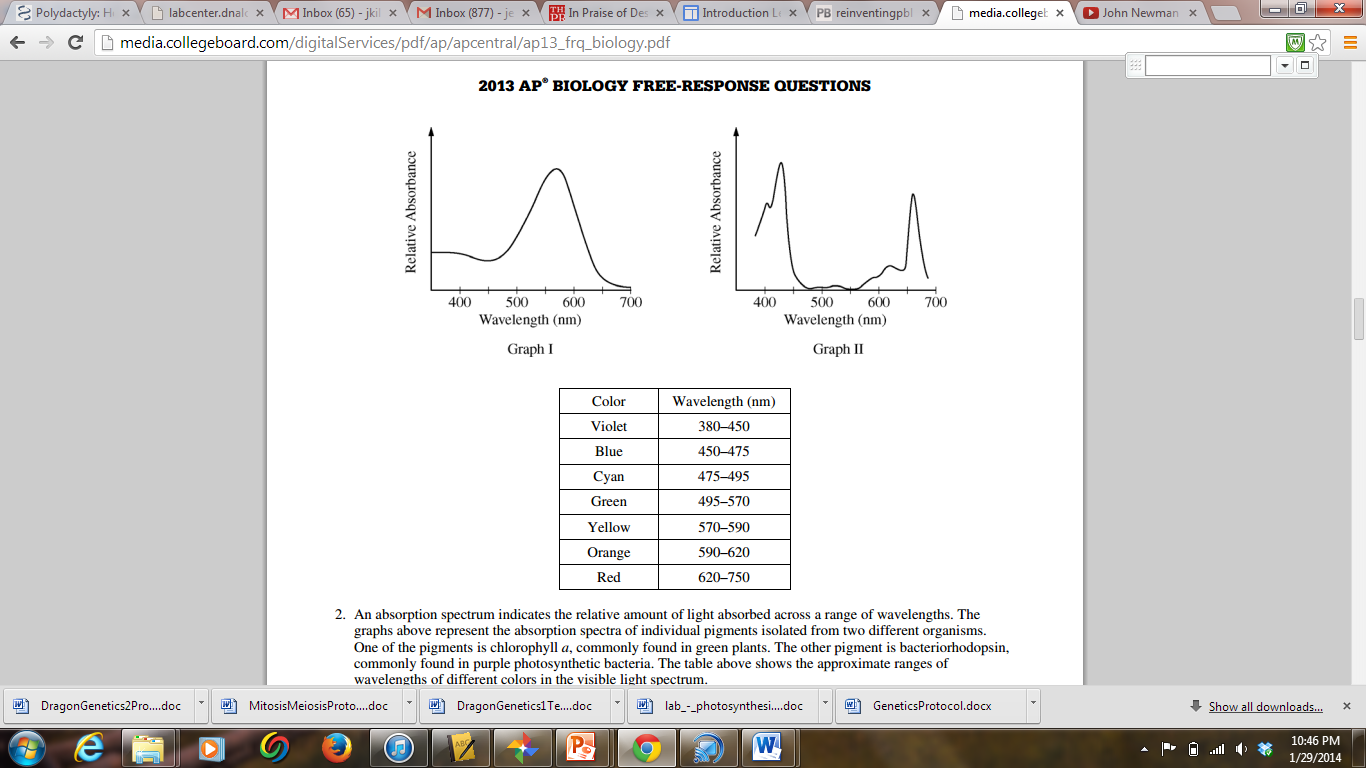
Name:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Period:\_\_\_\_\_\_\_

AP Bio FRQ: Relationship between Light Wavelength and Photosynthesis



An absorption spectrum indicates the relative amounts of light absorbed across a range of wavelengths. The graphs above represent the absorption spectra of individual pigments isolated from two different organisms. One of the pigments is chlorophyll *a*, commonly found in green plants. The other pigment is bacteriohodopsin, commonly found in purple photosynthetic bacteria. The table above shows the approximate ranges of wavelength of different colors in the visible light spectrum.

1. **Identify** the pigment (chlorophyll *a* or bacteriorhodopsin) used to generate the absorption spectrum in each of the graphs above. **Explain** and **justify** your answer. (3 points)

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1. In an experiment, identical organisms containing the pigment from Graph II as the predominant light-capturing pigment are separated into three groups. The organisms in each group are illuminated with light of a single wavelength (650 nm for the first group, 550 nm for the second group, and 430 nm for the third group.) The three light sources are of equal intensity and all organisms are illuminated for equal lengths of time. **Predict**the relative rate of photosynthesis in each of the three groups. **Justify** your predictions. (5 points)

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1. Bacteriohodopsin has been found in aquatic organisms whose ancestors existed before the ancestors of plants evolved in the same environment. **Propose** a possible evolutionary history of plants that could have resulted in a predominant photosynthetic system that uses only some of the colors of visible light. (2 points)

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